

From Farm to Plate: Why Responsible Antibiotic Use in Animals Matters to Every Indian

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Abstract

Antibiotics are essential medicines in veterinary practice, helping treat bacterial infections, reduce animal suffering and protect farmers' livelihoods. However, inappropriate use, including unnecessary treatment, incorrect dosing and unsupervised changes to treatment schedules, can contribute to antimicrobial resistance (AMR) and increase the risk of drug residues in animal-derived foods. Resistant bacteria can spread among animals, humans and the environment through direct contact, contaminated food, animal waste and water. Responsible antibiotic use therefore extends beyond individual animal treatment and represents an important food-safety and public-health priority. Veterinarians play a central role through accurate diagnosis, appropriate prescribing, diagnostic testing when indicated and monitoring for adverse drug reactions. Farmers must follow prescribed treatment plans, maintain treatment records and observe the specified withdrawal periods for milk, meat, eggs and other food products. Preventive measures, including vaccination, balanced nutrition, sanitation, suitable housing and farm biosecurity, can reduce infections and the need for antimicrobial treatment. A coordinated One Health approach involving veterinarians, farmers, consumers and regulatory authorities is essential to protect animal welfare, maintain food safety and preserve antibiotic effectiveness for future generations.

Keywords: Antibiotics; antimicrobial resistance; veterinary medicine; One Health; responsible antimicrobial use; withdrawal period; food safety; veterinary pharmacology; biosecurity; animal health

A glass of milk, an egg at breakfast, chicken at lunch, or fish at dinner—animal-derived foods are part of daily life for millions of Indian families. Behind these foods are farmers who work hard to keep their animals healthy. When animals fall ill, medicines, including antibiotics, can save lives, reduce suffering, and protect livelihoods.

But antibiotics are powerful medicines, not routine feed supplements or quick fixes. When used without proper veterinary guidance, at the wrong dose, for the wrong disease, or for too short a time, they can create problems beyond a single farm. They may leave unwanted residues in food and help bacteria become resistant to treatment. India is actively

strengthening its One Health response to antimicrobial resistance (AMR) in animal agriculture.

This is why responsible antibiotic use in animals is not only a veterinary issue. It is a food-safety, public-health, farmer-income, and environmental issue.

What are antibiotics—and when are they needed?

Antibiotics are medicines used to treat infections caused by bacteria. They do not cure viral diseases, nutritional problems, parasitic infestations, heat stress, or poor management. Giving an antibiotic “just in case” may therefore provide no benefit while increasing

risk.

A veterinarian considers several factors before prescribing an antibiotic:

- the species and age of the animal;
- signs of illness and the likely cause;
- whether laboratory testing or a culture-and-sensitivity test is required;
- the correct medicine, dose, route, and duration;
- pregnancy, lactation, kidney or liver function, and other medicines being used; and
- whether the animal produces milk, meat, eggs, or honey for human consumption.

The same medicine can behave very differently in a cow, buffalo, goat, dog, chicken, fish, or horse. A dose appropriate for one species may be ineffective or dangerous in another. This is exactly why animal treatment should be guided by a qualified veterinarian.

The hidden danger of incomplete or unnecessary treatment

One common mistake is stopping treatment as soon as an animal appears better. Visible signs of disease may improve before bacterial infection is adequately controlled. Stopping early can allow surviving bacteria to multiply again and may make future treatment more difficult.

Other risky practices include using leftover medicines from a previous illness, copying another farmer's prescription, or changing doses without veterinary advice. Fever, diarrhoea, coughing, reduced appetite, or low milk yield do not automatically mean that an antibiotic is needed. The cause may instead be viral, parasitic, metabolic, toxic, or nutritional.

Unnecessary use exposes bacteria to antibiotics without properly eliminating them. Over time, some bacteria can develop the ability to survive medicines that once worked. This is called antimicrobial resistance, or

AMR. ICAR has highlighted the need for rational antimicrobial use, stronger surveillance, and collaboration across animal, human, and environmental health sectors.

Why antimicrobial resistance concerns everyone

AMR means that bacteria no longer respond well to medicines designed to kill them. Resistant bacteria can affect animals, people, and the environment. They may spread through direct animal contact, farm waste, water, food, and the wider ecosystem.

For farmers, AMR can mean recurring disease, higher treatment costs, reduced milk or egg production, poor growth, and greater losses. For veterinarians, it means fewer effective treatment choices. For families, it threatens the future usefulness of antibiotics that are essential in both human and animal medicine.

This is the basis of the One Health approach: the health of people, animals, and the environment is closely connected. Responsible veterinary prescribing is one of the most practical ways to protect antibiotics for the future.

What is a withdrawal period?

A withdrawal period is the minimum time that must pass between the last dose of a veterinary medicine and the use of food products from that animal, such as milk, meat, eggs, or honey.

During this period, the medicine is being cleared from the animal's body. If milk is sold, eggs are consumed, or an animal is slaughtered before the specified withdrawal period ends, medicine residues may remain in the food.

The withdrawal period is not the same for every medicine. It depends on:

- the particular drug and formulation;
- the dose and route of administration;
- the animal species;
- whether the food product is milk, meat, eggs, or honey; and

- the approved label instructions or the veterinarian's directions.

There is no safe “one-size-fits-all” waiting time. Farmers should record the treatment date, medicine name, dose, animal identification, and the exact date on which milk, eggs, or meat may safely re-enter the food chain. Indian drug-safety information recognises the importance of appropriate use and food-animal withdrawal intervals.

Food safety begins on the farm

Safe food is not achieved only at the dairy, market, or kitchen. It starts with animal health and good farm practices.

A farm that uses medicines responsibly is more likely to produce safe milk, meat, eggs, and fish. Simple habits make a major difference:

- Seek veterinary advice promptly when an animal is sick.
- Use only medicines prescribed or specifically recommended for that animal.
- Follow the exact dose, route, frequency, and duration advised.
- Do not share medicines between species or use human medicines in animals without veterinary direction.
- Never use leftover antibiotics for a new illness.
- Maintain a treatment register for every animal or flock.
- Observe the stated withdrawal period without exception.
- Keep medicines under the correct storage conditions and check expiry dates.
- Avoid products with unclear labels, missing batch details, or doubtful origin.
- Improve hygiene, housing, nutrition, vaccination, biosecurity, and parasite

control to reduce the need for antibiotics in the first place.

Prevention is better—and often cheaper—than treatment

The best antibiotic is often the one that never has to be used. Preventing disease reduces animal suffering, preserves farmer income, and slows the development of resistance.

Good prevention includes clean water, balanced feeding, appropriate ventilation, dry bedding, reduced overcrowding, vaccination, quarantine of newly purchased animals, regular veterinary visits, and timely diagnosis. In dairy herds, proper milking hygiene can reduce mastitis. In poultry, biosecurity and vaccination are essential. In sheep and goats, strategic deworming based on local risk and veterinary advice can reduce repeated blanket treatment and help limit anthelmintic resistance.

These measures do not replace treatment when treatment is genuinely needed. Instead, they ensure that antibiotics are used carefully and effectively when they are truly required.

The special role of veterinary pharmacologists

Veterinary pharmacologists help ensure that medicines used in animals are effective, safe, and responsible. Their work includes studying how drugs are absorbed, distributed, metabolised, and eliminated in different species; determining safe doses; identifying adverse effects and drug interactions; developing residue-testing methods; and advising on withdrawal periods.

They also have an important role in monitoring AMR, assessing new medicines, evaluating herbal and ethnoveterinary products, and promoting veterinary pharmacovigilance—the reporting of suspected medicine-related problems. CDSCO's post-marketing safety framework includes veterinary products, highlighting the value of continued monitoring after medicines enter use. Veterinary pharmacology also has a

conservation role. India has issued restrictions on certain veterinary pain medicines because of their potential effects on scavenging birds and wildlife.

A shared responsibility

Farmers should never be blamed for the burden of AMR. Many face economic pressure, limited access to veterinary services, and the urgent need to save a sick animal. The solution is to make sound veterinary advice, diagnostic support, quality medicines, and clear information more accessible.

Consumers also have a role. Choosing food from responsible producers, supporting veterinary services, and understanding that safe food production requires time and careful treatment practices can strengthen the entire system.

Antibiotics remain among the most valuable tools in animal health. Their value must be protected. By using them only when needed, under veterinary guidance, and with full respect for withdrawal periods, we can keep animals healthier, food safer, farms more productive, and lifesaving medicines effective for future generations.

Healthy animals, safe food, and protected antibiotics begin with one principle: every animal medicine should be used responsibly, under veterinary guidance.

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